

WHAT WE CLAIM ARE:

1. A method of manufacturing a liquid crystal display, comprising the steps of:
  - (a) heating a liquid crystal display substrate and forming a main wiring layer of Al or Al alloy thereon, in which grains are grown in the formed
  - 5 main wiring layer and the substrate is heated to such a temperature as the main wiring layer has an irregular surface having an average roughness Ra of 3 nm or larger;
  - (b) forming a heat resistant cover metal layer on the main wiring layer to form a laminated metal layer; and
  - 10 (c) heating the substrate and forming an insulating film on the laminated metal layer by CVD.
2. The method according to claim 1, wherein said step (a) grows grains in the main wiring layer in vertical direction.
- 15 3. The method according to claim 1, wherein said step (a) heats the substrate to a temperature of 175 °C to 400 °C.
4. The method according to claim 3, wherein said step (a) heats the substrate in
- 20 a heating chamber of a sputtering system, and transports the substrate into a sputtering chamber to form the main wiring layer by sputtering.
5. The method according to claim 1, wherein the heat resistant cover metal layer includes one of a refractory metal layer, a refractory metal alloy layer and a
- 25 nitrogen-containing refractory metal layer.

6. The method according to claim 1, wherein said step (b) forms a metal layer containing refractory metal on the main wiring layer by sputtering.
- 5 7. The method according to claim 6, wherein said step (b) stacks a nitrogen-containing refractory metal layer and a refractory metal layer on the main wiring layer.
8. A method of manufacturing a liquid crystal display, comprising the steps of:
- 10 (a) forming a main wiring layer of Al or Al alloy on a liquid crystal display substrate;
- (b) exposing the substrate to an atmosphere containing oxygen to naturally oxidize a surface of the main wiring layer;
- (c) forming a heat resistant cover metal layer on the main wiring
- 15 layer to form a laminated metal layer; and
- (d) heating the substrate and forming an insulating film on the laminated metal layer by CVD.
9. The method according to claim 8, wherein the heat resistant cover metal
- 20 layer includes one of a refractory metal layer, a refractory metal alloy layer and a nitrogen-containing refractory metal layer.
10. A liquid crystal display comprising:
- a liquid crystal display substrate;
- 25 a main wiring layer made of Al or Al alloy and formed on said

substrate; and

a protective layer containing refractory metal and formed on the main wiring layer,

wherein an upper surface of said main wiring layer has an average  
5 roughness of 3 nm or larger.

11. The liquid crystal display according to claim 10, wherein said main wiring layer forms gate wiring lines and storage capacitor wiring lines, and the liquid crystal display further comprises:

10 a gate insulating film covering said protective layer;  
a semiconductor layer formed on said gate insulating film;  
an insulating layer covering a region above said semiconductor layer; and  
pixel electrodes formed on said insulating layer.

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12. The liquid crystal display according to claim 10, further comprising:

an opposing substrate; and  
a liquid crystal layer sandwiched between said liquid crystal display substrate and said opposing substrate.

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13. A liquid crystal display comprising:

a liquid crystal display substrate; and  
a main wiring layer made of Al or Al alloy and formed on said main wiring layer,

25 wherein an upper surface of said main wiring layer is formed with a

natural oxide layer.

14. The liquid crystal display according to claim 13, wherein a stress of said main wiring layer is 150 MPa or smaller.

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15. The liquid crystal display according to claim 13, further comprising:  
a protective layer containing refractory metal and formed on the main wiring layer.

10 16. The liquid crystal display according to claim 15, wherein said main wiring layer forms gate wiring lines and storage capacitor wiring lines, and the liquid crystal display further comprises:

a gate insulating film covering said protective layer;  
a semiconductor layer formed on said gate insulating film;  
15 an insulating layer covering a region above said semiconductor layer; and  
pixel electrodes formed on said insulating layer.

17. The liquid crystal display according to claim 16, further comprising:  
20 an opposing substrate; and  
a liquid crystal layer sandwiched between said liquid crystal display substrate and said opposing substrate.